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# **Suisun Marsh Monitoring Program Channel Water Salinity Report**

Reporting Periods: February, March, and April 2011

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## 1. SUISUN MARSH MONITORING STATIONS AND REPORTING REQUIREMENT

As per SWRCB Water Rights Decision 1641, dated December 29, 1999, and previous SWRCB decisions, the California Department of Water Resources (DWR) is required to provide monthly channel water salinity compliance reports for the Suisun Marsh to the SWRCB. Conditions of channel water salinity in the Suisun Marsh are determined by monitoring specific electrical conductivity, which is referred as "specific conductance" (SC). The locations of all listed stations are shown in Figure 1.

The monthly reports are submitted for October through May each year in accordance with SWRCB requirements. The reports are required to include salinity data from the stations listed below to ensure salinity standards are met to protect habitat for waterfowl in managed wetlands:

Station Identification	Station Name	General Location	Classification
C-2*	Collinsville	Western Delta	Compliance Station
S-64	National Steel	Eastern Suisun Marsh	Compliance Station
S-49	Beldon's Landing	North-Central Suisun Marsh	Compliance Station
S-42	Volanti	North-Western Suisun Marsh	Compliance Station
S-21	Sunrise	North-Western Suisun Marsh	Compliance Station

Data from the stations listed below are included in the monthly reports to provide information on salinity conditions in the western Suisun Marsh.

Station Identification	Station Name	General Location	Classification
S-97	Ibis	Western Suisun Marsh	Monitoring Station
S-35	Morrow Island	South-Western Suisun Marsh	Monitoring Station

Information on Delta outflow, area rainfall, and operation of the Suisun Marsh Salinity Control Gates are also included in the monthly reports to provide information on conditions that may affect channel water salinity in the Marsh.

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\* Throughout the report, the representative data from nearby USBR station is used in lieu of data from station C-2.

## 2. Monitoring Results

### 2.1 Channel Water Salinity Compliance

During the month of February, March, and April of 2011, salinity conditions at all five compliance stations are in compliance with channel water salinity standards of SWRCB (Table 1). Compliance with standards for the month of February, March, and April were determined for each compliance station by comparing the progressive daily mean of high-tide SC with respective standards. The standard for compliance stations C-2, S-64, S-49, S-42, and S-21 were 8.0 mS/cm during February and March 2011, and 11.0 mS/cm during April 2011. Table 1 lists monthly mean high-tide SC at these compliance stations. The progressive daily mean (PDM) is the monthly average of both daily high-tide SC values. The mathematical equation is shown below.

$$\text{PDM} = \frac{\sum \text{daily average of high tide SC}}{\text{\# days of the month}}$$

### 2.2 Delta Outflow

Outflow during the first half of February 2011 was below 22,000 cfs and increased in the second half with a peak above 50,000 cfs in late February and decreased at the end of the month but still above 40,000 cfs. March outflow was higher than February, and remained above 36,000 cfs the first half. In the second half of March, outflow increased sharply with a peak of above 200,000 cfs before going decreasing above 140,000 cfs at the end of the month. April outflow pattern had a downward trend for most of the month with the first half declining from 145,000 cfs to 70,000 cfs, and the second half continued to decline but at a slower rate and ending the month still on a high note above 60,000 cfs. Between the three months, March outflow was the largest, followed by April and February.

The monthly Delta outflow is represented by the mean Net Delta Outflow Index (NDOI). The NDOI is the estimated daily average of Delta outflow. Mean NDOI for February, March, and April 2011 are listed below:

Month	Mean NDOI (cubic feet per second)
February	27,184
March	102,773
April	91,240

## 2.3 Rainfall

Rainfall data are recorded from Fairfield Water Treatment Plant in Suisun City, CA. February rainfall events occurred only in the second half of February as shown in Figure 1. March rainfall events were throughout the month, but most precipitation activity occurred in late March. April rainfall events were minimal in amount and frequency compared to February and March. The largest daily precipitation total during these three months was 1.36 inches, and occurred in late February. Both February and March months have the most rainfall activities and amount. However, the largest monthly total was in March, followed by February, then April.

The monthly total for the three months are shown below:

Month	Total Rainfall (inches)
February	4.26
March	5.05
April	0.39

## 2.4 Suisun Marsh Salinity Control Gate (SMSCG) Operations

Operations and flashboard/boat lock installations at the SMSCG during February through April 2011 are summarized below.

Date	Gate status	Flashboards status	Boat Lock status
Feb 1 – Feb 2	1 closed; 2 held open	In	Open
Feb 3 – Apr 30	3 open	In	Open

Gate 3 electrical problem was fixed and tested by February 2. Thereafter, all three gates were in the held open position between February and April with flashboards in and boat lock gates open 24/7 per NOAA agreement. Gate operations continued to be suspended since December 8, 2010 due to continued low channel water salinity conditions as a result of increased outflow since mid-February. DWR will continue to monitor conditions and will re-operate as needed to control salinity in the marsh, but given the low salinity levels in late April; meeting next month monthly standard should not be a problem at all.

### **3. Discussion**

#### **3.1 Factors Affecting Channel Water Salinity in the Suisun Marsh**

Factors that affect channel water salinity levels in the Suisun Marsh include:

- delta outflow;
- tidal exchange;
- rainfall and local creek inflow;
- managed wetland operations; and,
- operations of the SMSCG and flashboard configurations.

#### **3.2 Observations and Trends**

##### **3.2.1 Conditions during the Reporting Period**

During February, March, and April of 2011 PDM salinity levels at Collinsville(C-2), National Steel (S-64), Beldons (S-49), and Volanti(S-42) were less than 5.0 mS/cm, 3.0 mS/cm, and 1.0 mS/cm, respectively, for the entire month as shown in Figure 2, 4, and 6. Salinity levels at all compliance and monitoring stations were higher in February than March and April because outflow was lower in February than March and April. Salinity levels at all compliance stations in March were on a gradual decline, whereas April levels were stable throughout the month because of extremely large amount of outflow carry over from March. Monitoring stations, S35 and S97, salinity levels and patterns between February and April varies from that of compliance stations because both are mostly impacted by creek flows and are of smaller sloughs.

Overall, compliance was met at all stations in between February and April 2011.

##### **3.2.2 Comparison of Reporting Period Conditions with Previous Years**

Monthly mean high-tide SC at the compliance and monitoring stations for February, March, and April of 2011 was compared with means for those months during the previous nine years (Figures 8, 9, 10).

Compared to previous nine years, February 2011 salinity levels resemble that of 2010, March 2011 resemble that of 2002 with a lower magnitude, and April 2011 resemble that of 2006 with a slightly higher magnitude and the except of S35 and S97 patterns. Overall, February 2011 was ranked sixth in high Specific Conductance, March 2011 was ranked fourth in high Specific Conductance, and April 2011 was ranked seventh in high Specific Conductance.

**Table 1**

**Monthly Mean High Tide Specific Conductance at Suisun Marsh  
Water Quality Compliance Stations**

**February 2011**

Station	Specific Conductance (mS/cm)*	Standard	Standard meet?
C-2**	0.4	8.0	Yes
S-64	0.9	8.0	Yes
S-49	3.3	8.0	Yes
S-42***	3.3	8.0	Yes
S-21***	3.6	8.0	Yes

\*milliSiemens per centimeter

\*\*The representative data from nearby USBR station is used in lieu of data from station C-2.

\*\*\*End of month PDM value not representative due to missing data resulting from failed QA/QC.

**March 2011**

Station	Specific Conductance (mS/cm)*	Standard	Standard meet?
C-2**	0.1	8.0	Yes
S-64	0.5	8.0	Yes
S-49	1.5	8.0	Yes
S-42***	1.1	8.0	Yes
S-21	1.5	8.0	Yes

\*milliSiemens per centimeter

\*\*The representative data from nearby USBR station is used in lieu of data from station C-2.

\*\*\*End of month PDM value not representative due to missing data resulting from failed QA/QC.

**April 2011**

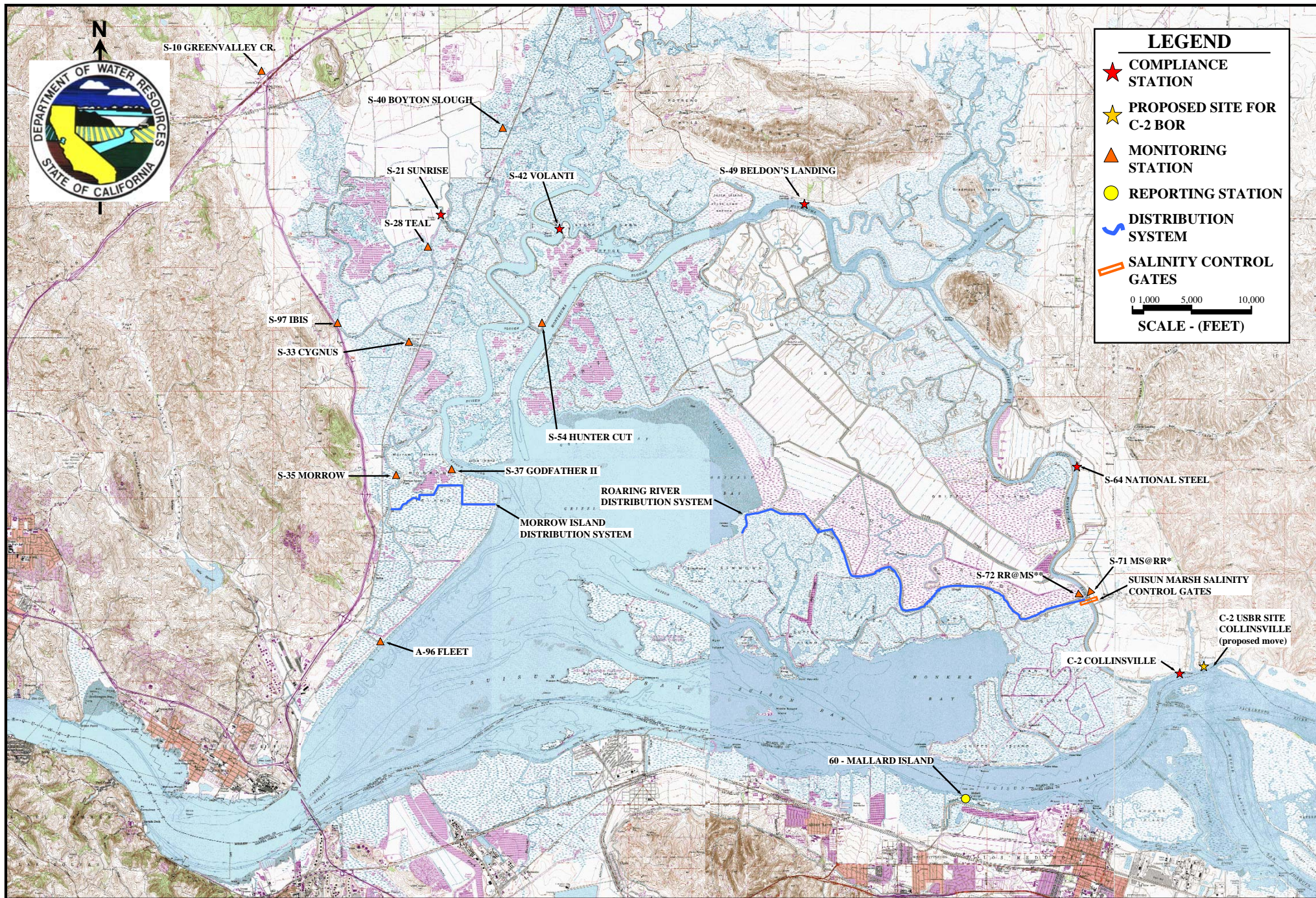
Station	Specific Conductance (mS/cm)*	Standard	Standard meet?
C-2**	0.2	11.0	Yes
S-64	0.4	11.0	Yes
S-49	0.8	11.0	Yes
S-42***	1.0	11.0	Yes
S-21***	1.3	11.0	Yes

\*milliSiemens per centimeter

\*\*The representative data from nearby USBR station is used in lieu of data from station C-2.

\*\*\*End of month PDM value not representative due to missing data resulting from failed QA/QC.

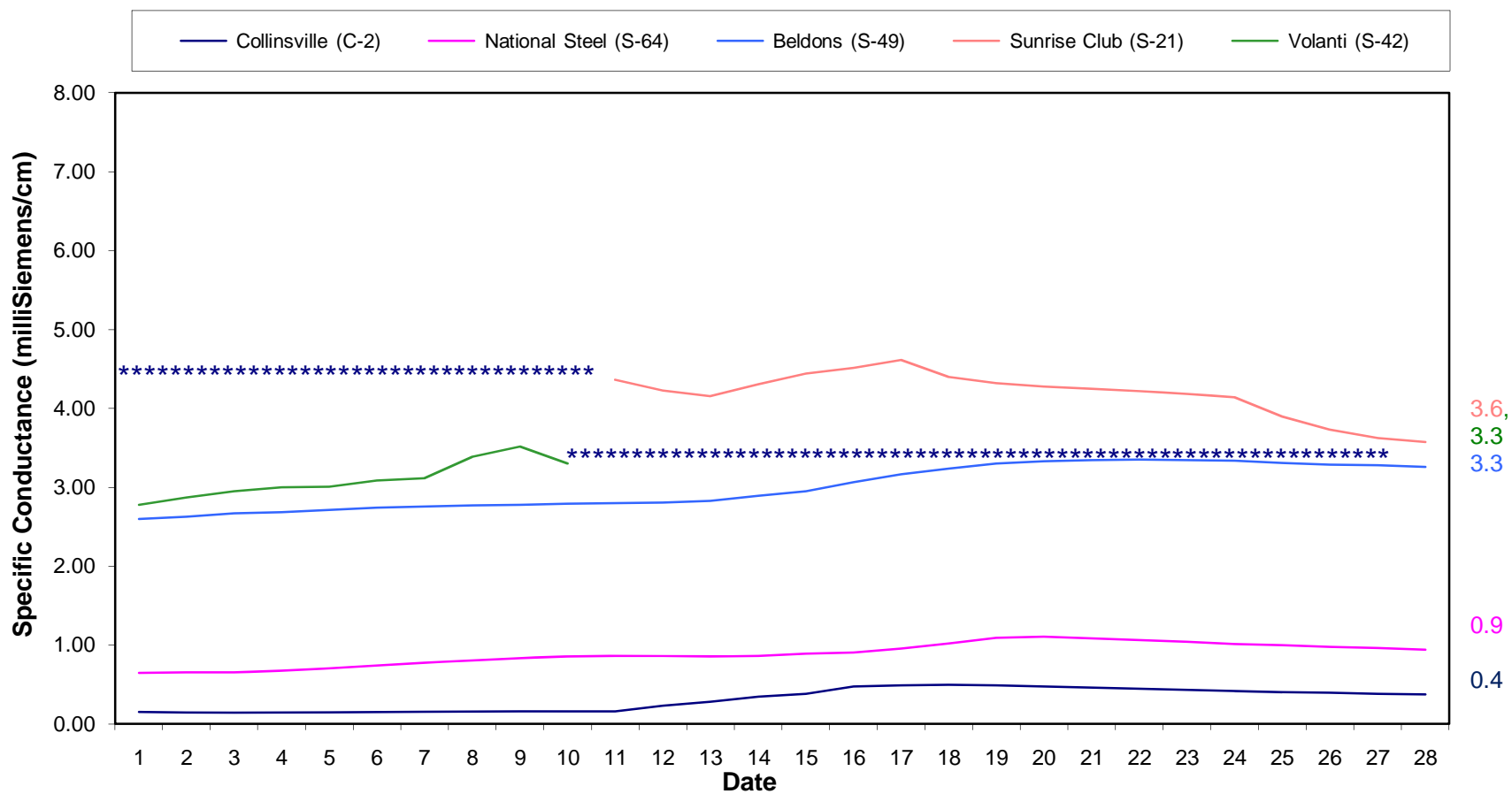






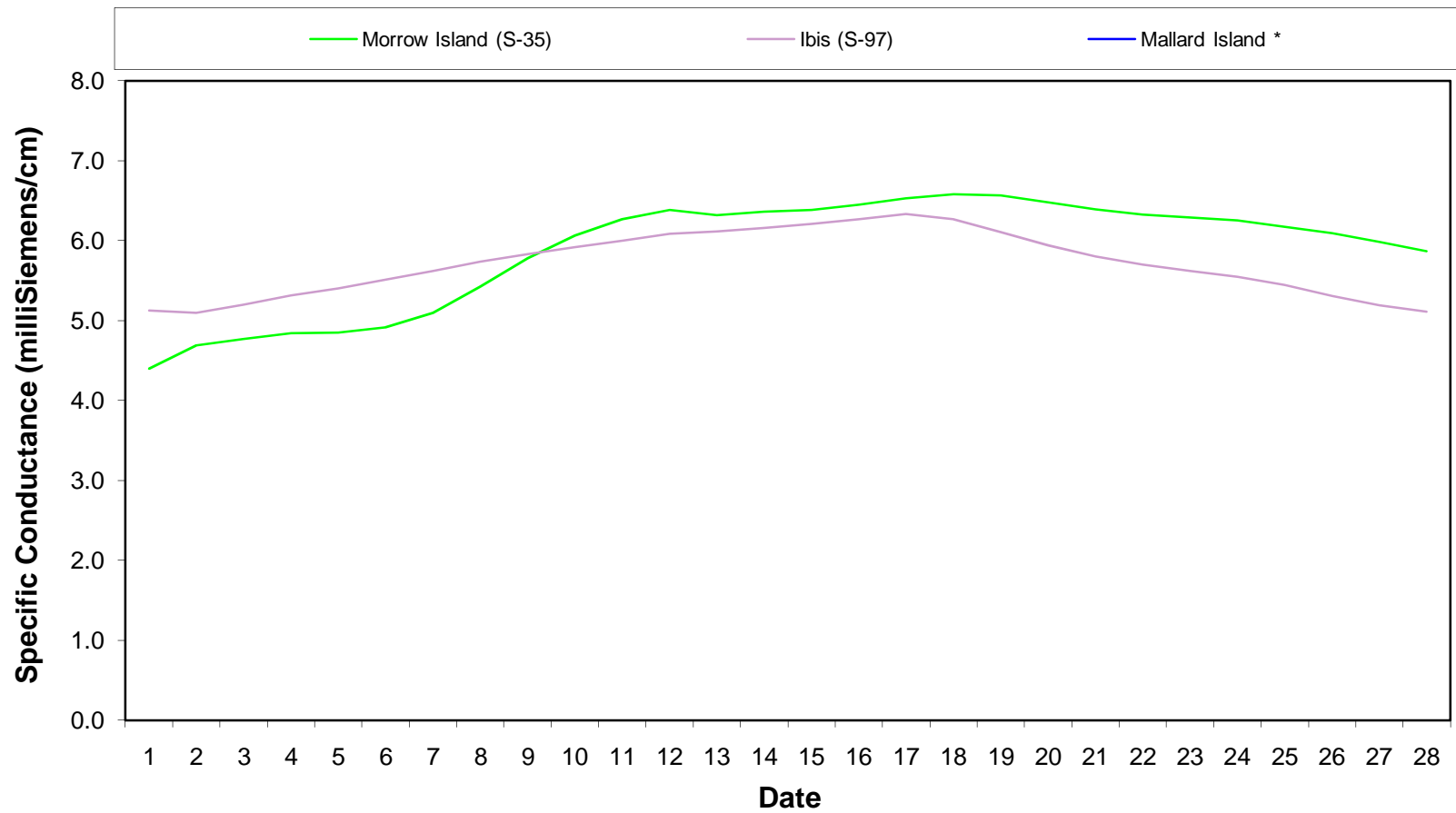
**Figure 2. Suisun Marsh Calendar Month Progressive Mean  
of the Specific Conductance at High Tide  
February 2011**

Standard = 8.0 mS/cm



\*\*\*\*\* \* = data missing at station due to failed QA/QC.

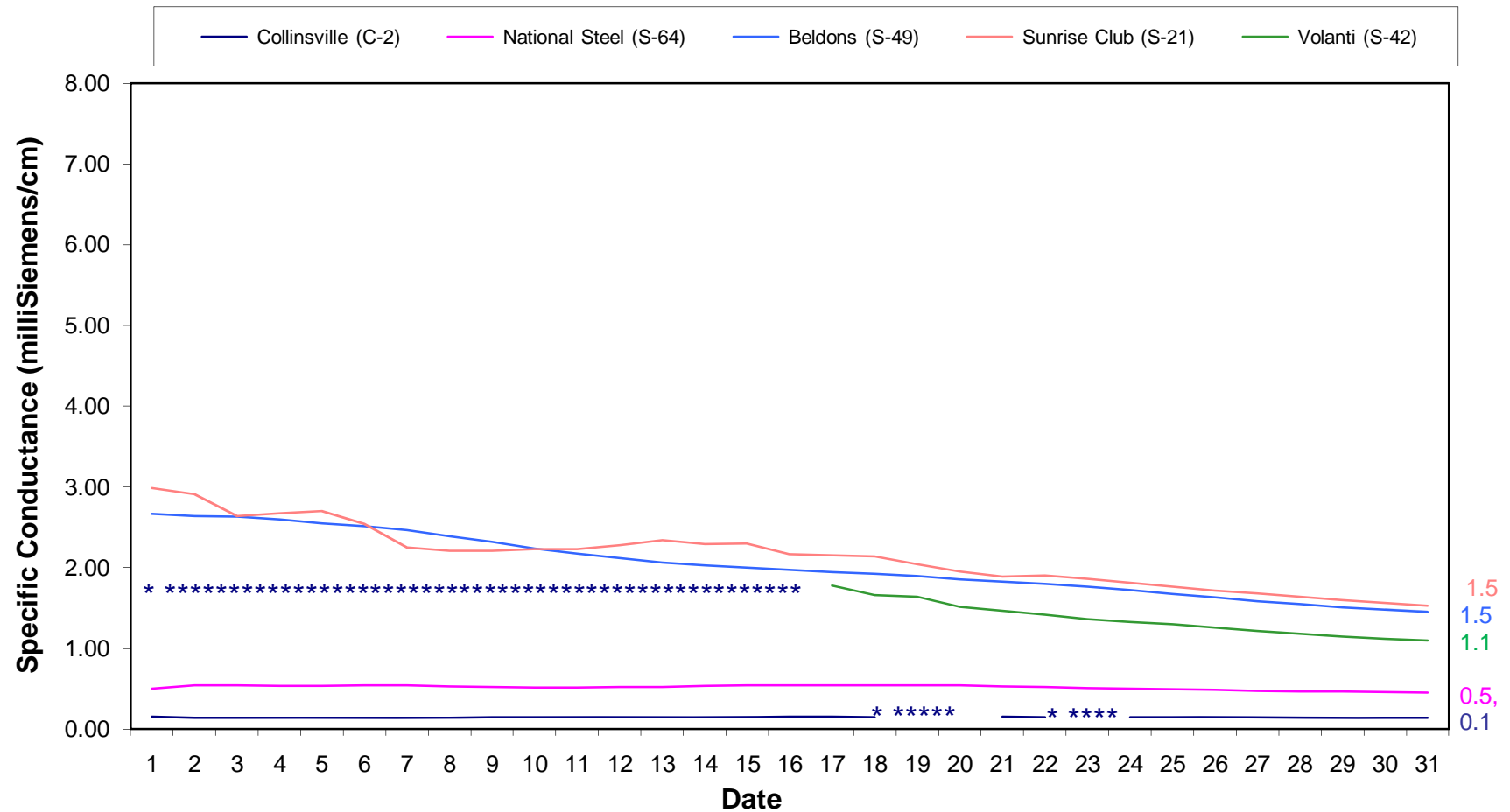
**Figure 3. Suisun Marsh Mean Daily High Tide Specific Conductance  
at Monitoring Stations S-35, S-97 and Mallard Island  
February 2011**



\* = Mallard Island station data used to represent conditions at Chipps and VanSickle Islands.

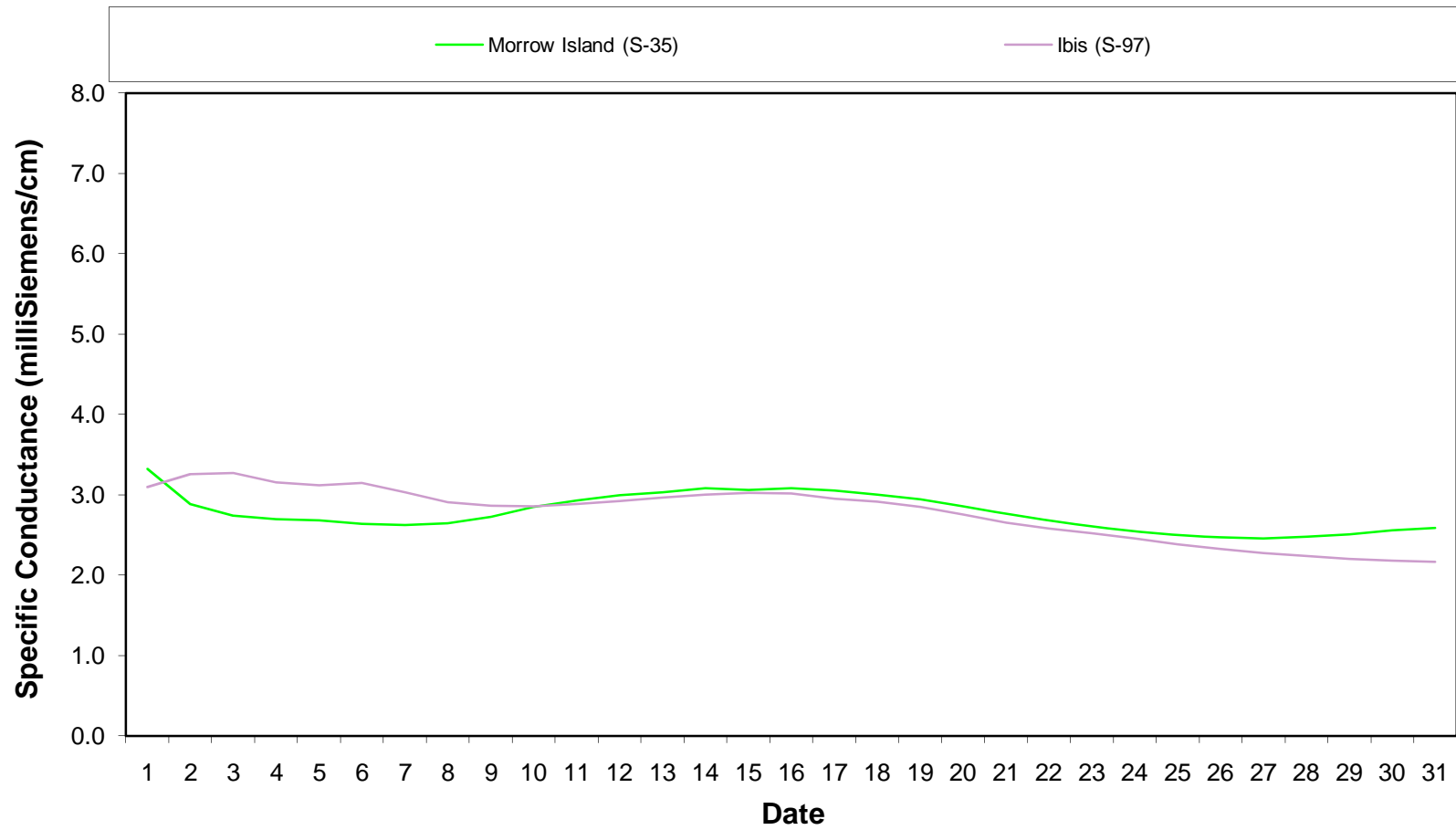
**Figure 4. Suisun Marsh Calendar Month Progressive Mean  
of the Specific Conductance at High Tide  
March 2011**

Standard = 8.0 mS/cm



\*\*\*\*\* \* = data missing at station due to failed QA/QC.

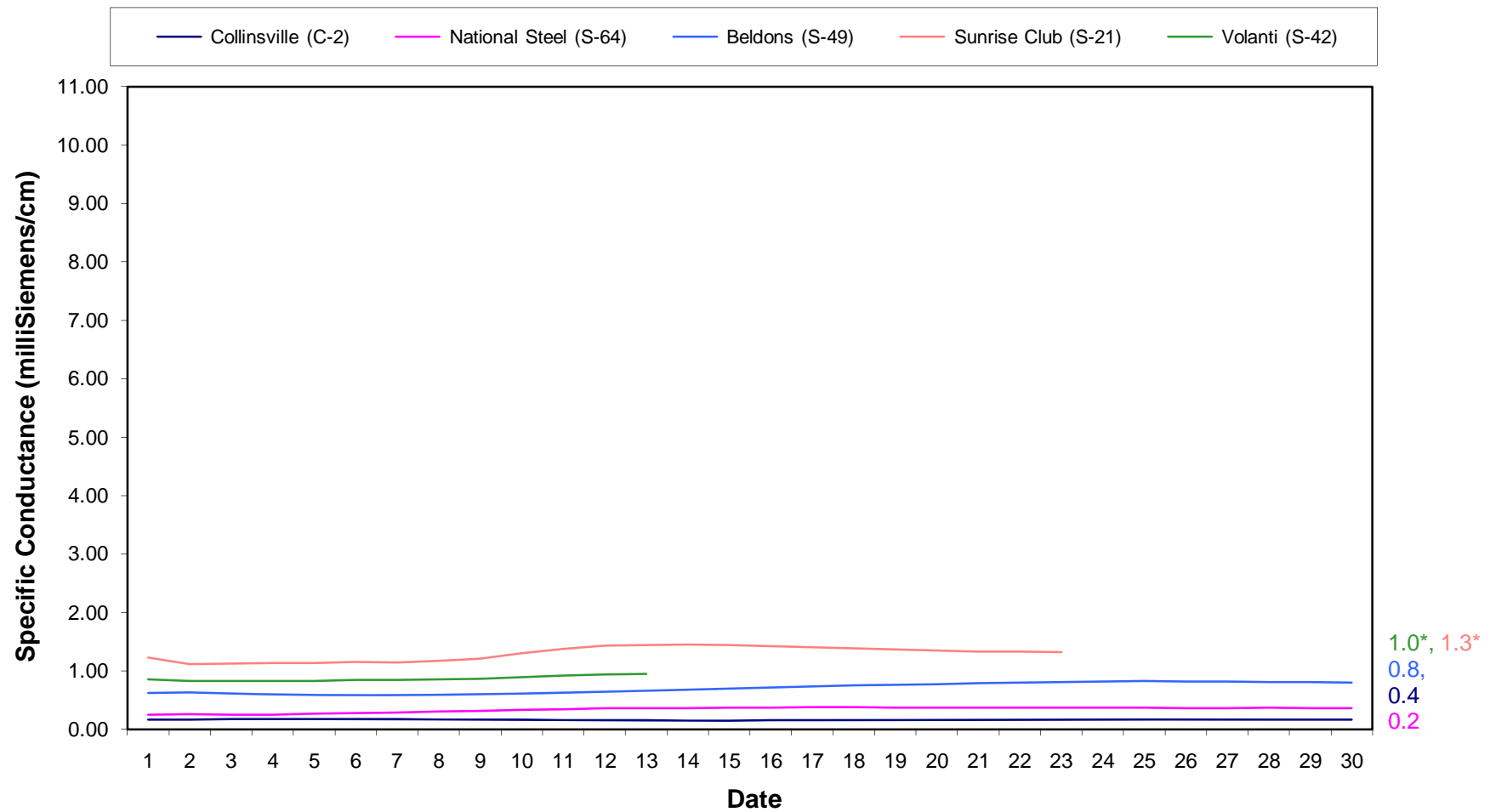
**Figure 5. Suisun Marsh Daily Mean High Tide Specific Conductance  
at Monitoring Stations S-35 and S-97  
March 2011**





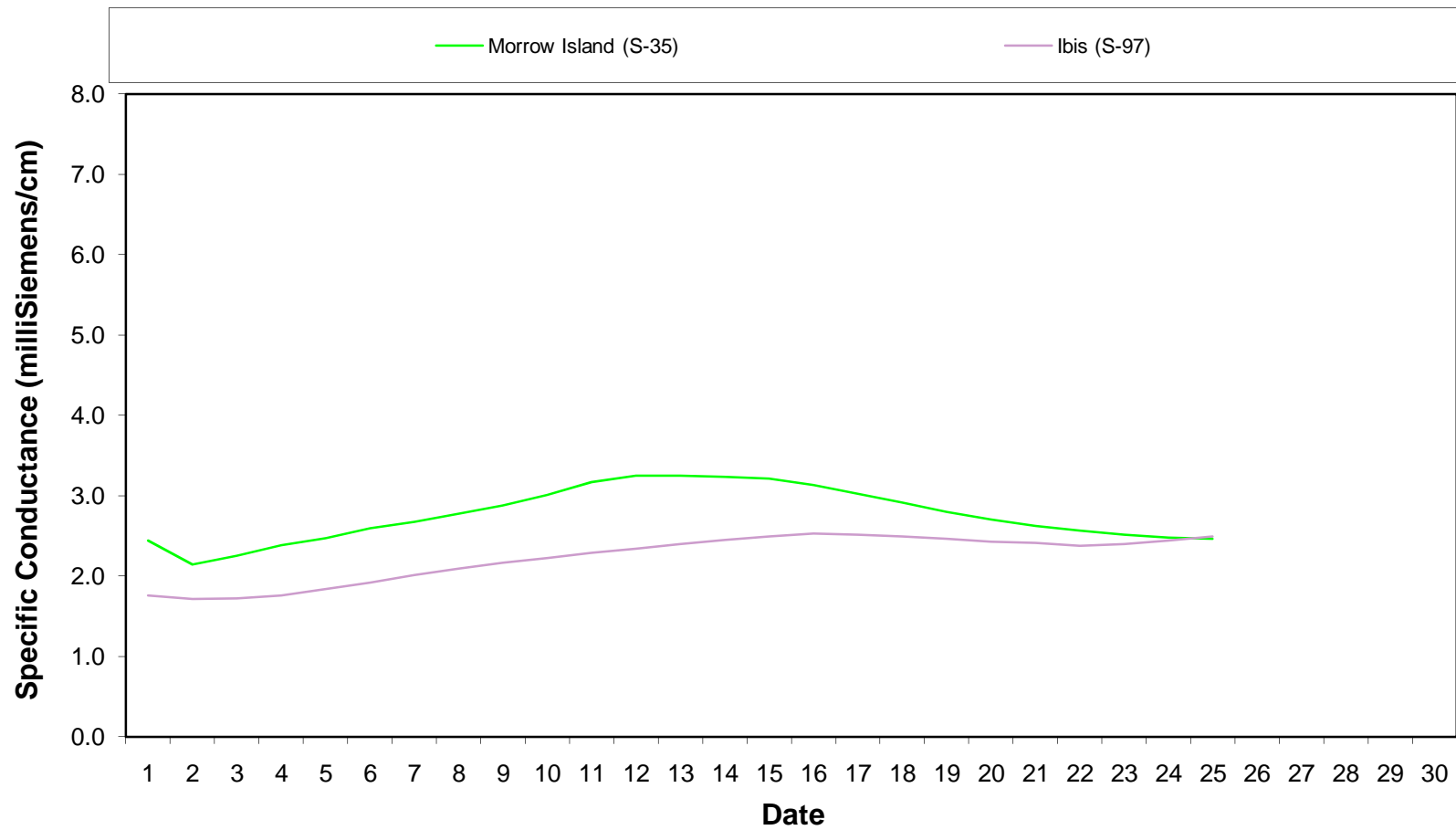
**Figure 6. Suisun Marsh Calendar Month Progressive Mean  
of the Specific Conductance at High Tide  
April 2011**

Standard = 11.0 mS/cm

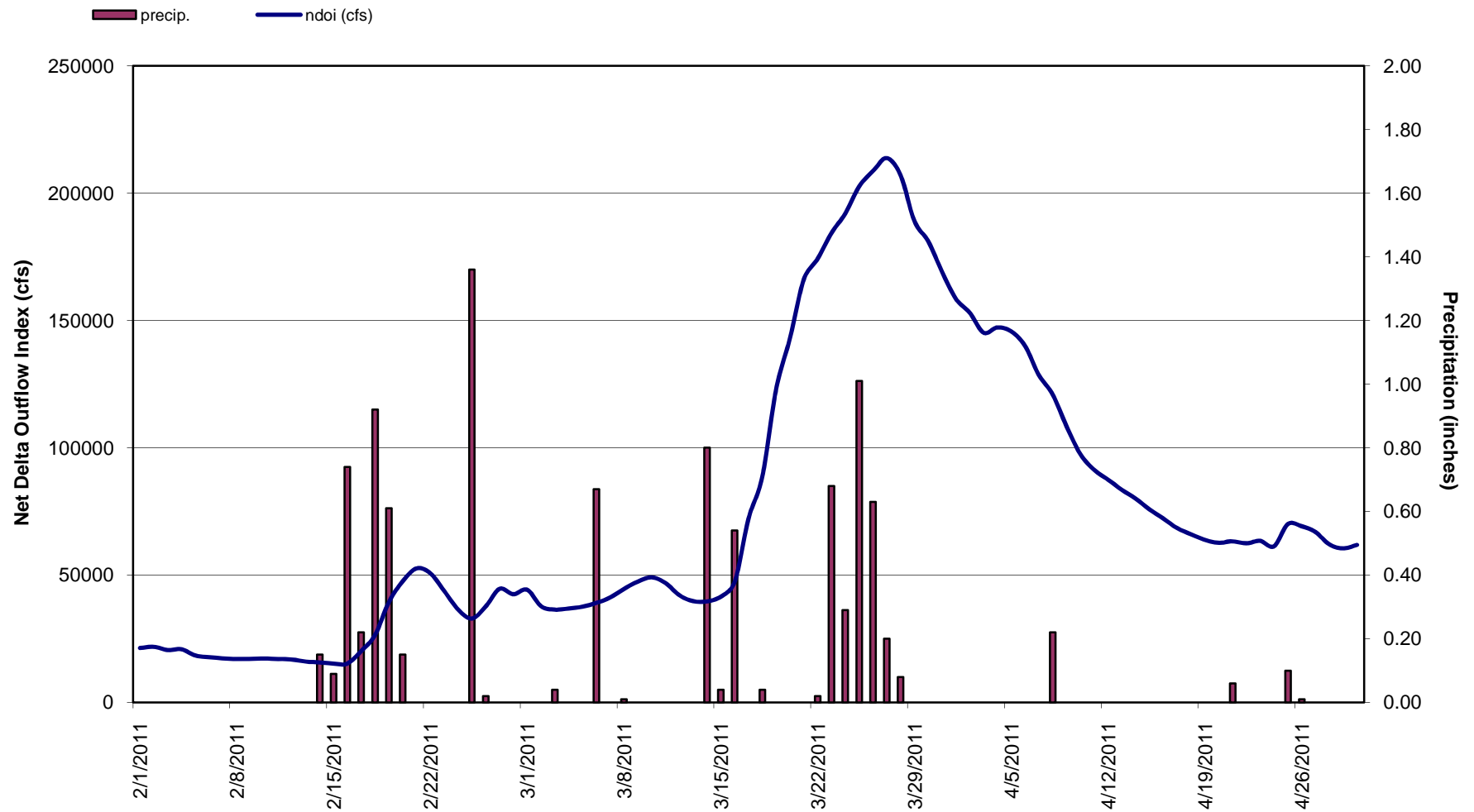


\*data missing at station due to failed QA/QC.

**Figure 7. Suisun Marsh Daily Mean High Tide Specific Conductance  
at Monitoring Stations S-35 and S-97  
April 2011**

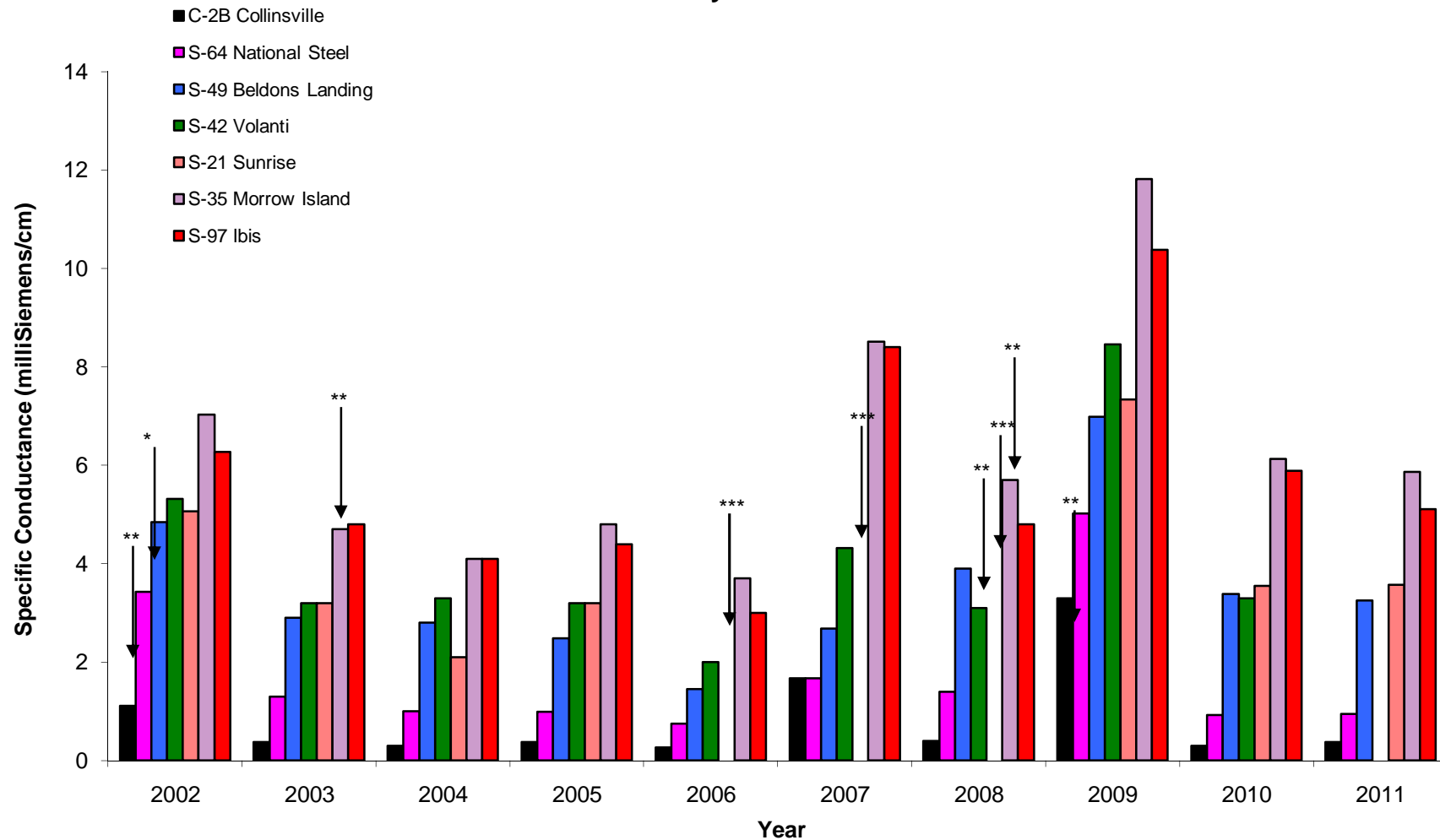


**Figure 8. Daily Net Delta Outflow Index and Precipitation\***  
**February, March, and April 2011**



\*Preliminary DWR, O&M Delta Outflow data and precipitation from Fairfield Water Treatment Plant.

**Figure 9. Monthly Mean Specific Conductance at High Tide:  
Comparison of Monthly Values for Selected Stations  
February of 2002-2011**



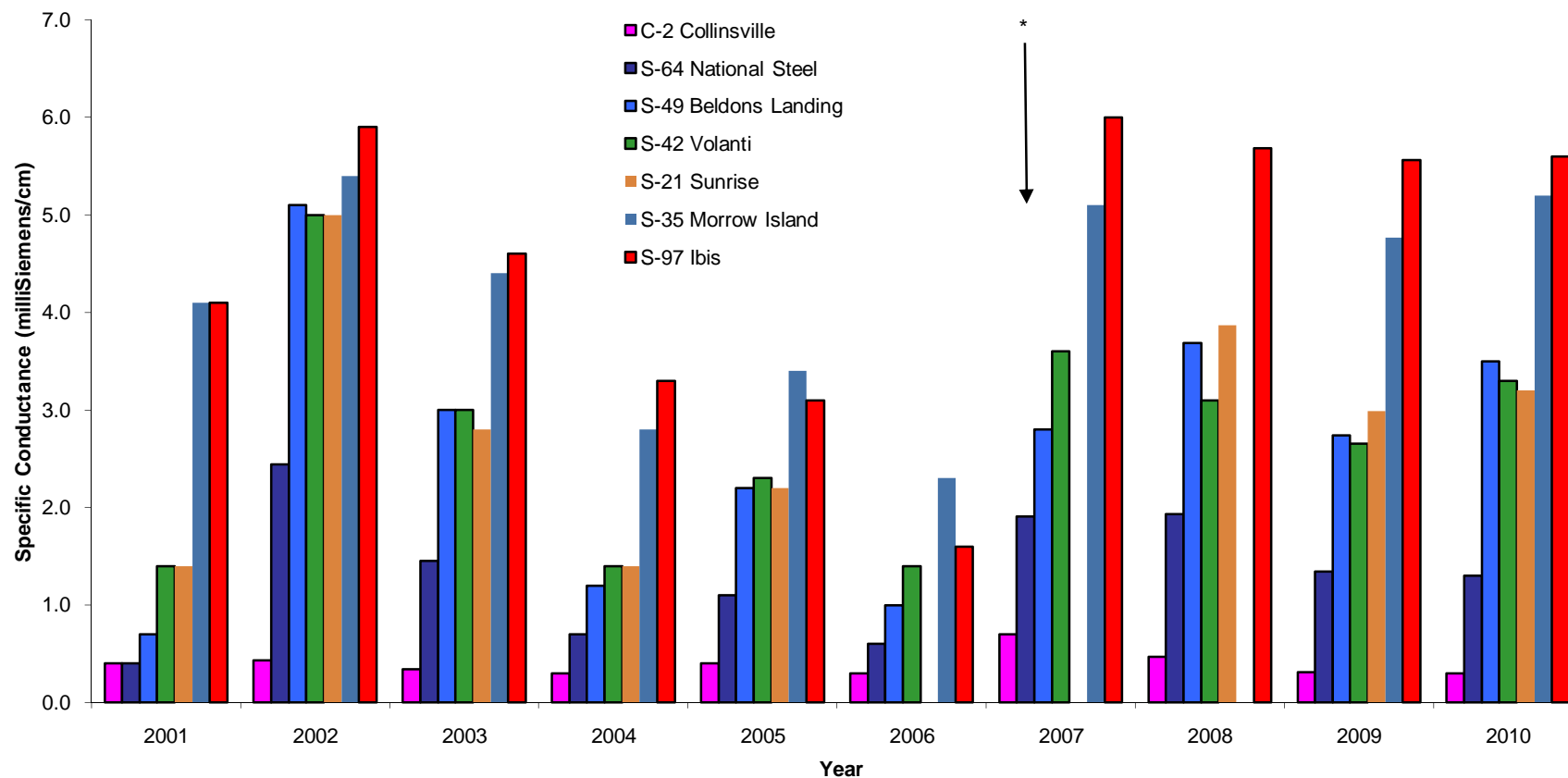
\*Representative data from nearby USBR station is used in lieu of station C-2 from 2002 and thereafter.

\*\*Data missing due to equipment failure or power outage. Number of missing data is small enough not to alter end of month value.

\*\*\*Data not available due to flooded levees and inaccessible roads.



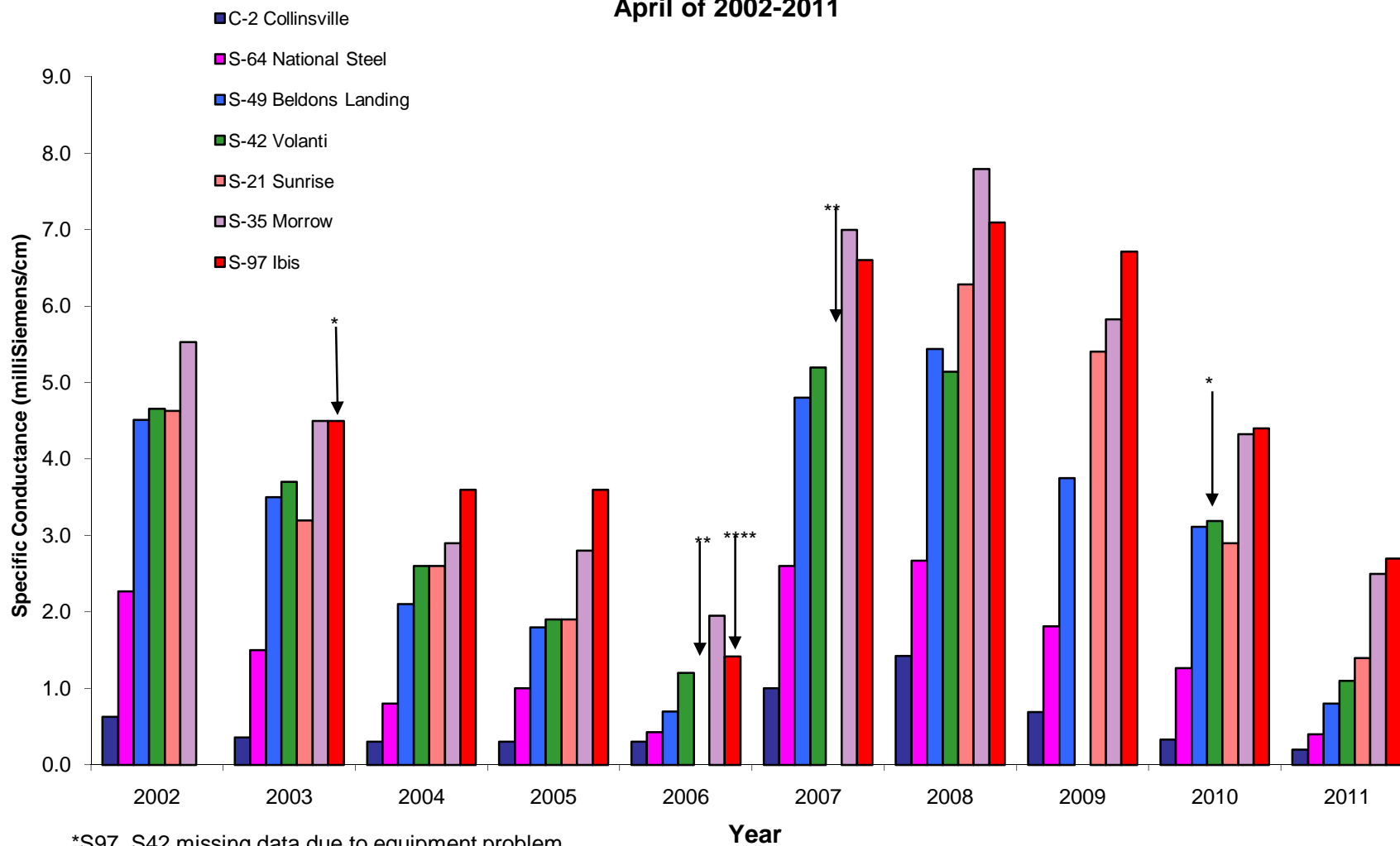
**Figure 10. Monthly Mean Specific Conductance at High Tide:  
Comparison of Monthly Values for Selected Stations  
March of 2002-2011\*\*\*\***



\*\*\*\*2006 and 2007 data not available for S21 due to flooded roadways.

\*Data not available for S35 due to equipment upgrade down time.

**Figure 11. Monthly Mean Specific Conductance at High Tide  
Comparison of Monthly Values for Selected Stations  
April of 2002-2011**



\*S97, S42 missing data due to equipment problem.

\*\*S21 data not available due to flooded roads.

\*\*\*S97 data not representative of end of month value due to missing data within the month.